

**Complementary 2-D MESFET for
Low Power Electronics**

Interim Report # 1

**Air Force SBIR Phase I
Contract Number: F33615-95-C-1679**

May 16, 1995

Delivered To:

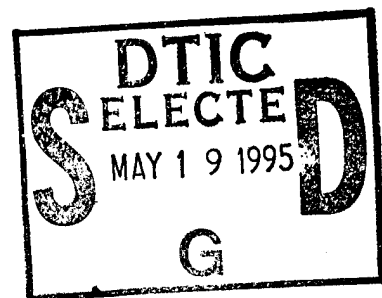
**Dr. Edgar J. Martinez
BLDG 620
2241 Avionics Circle Ste 17
Wright-Patterson AFB OH 45433-7319
TEL: (513) 255-8636**

From:

**Advanced Device Technologies, Inc.
1590 Ravens Place
Charlottesville, VA 22901
TEL: (804) 974-1416**

W.C.B. Peat

Dr. William C.B. Peatman, President



Accession For	
NTIS CRA&I	<input checked="" type="checkbox"/>
DTIC TAB	<input type="checkbox"/>
Unannounced	<input type="checkbox"/>
Justification	
By	
Distribution /	
Availability Codes	
Dist	Avail and/or Special
A-1	

DTIC QUALITY INSPECTED 5

Approved for public release; distribution is unlimited.

19950518 055

**Complementary 2-D MESFET for Low Power Electronics
(AirForce SBIR Contract F33615-95-C-1679)**

Phase I Interim Report #1

As detailed in the Phase I proposal, the project has four major tasks. These are 1) assessment of the p-channel 2-D MESFET device fabrication, 2) development of a p-channel 2-D MESFET model and implementation of the model into AIM-SPICE, 3) circuit simulations of complementary 2-D MESFET circuits using AIM-SPICE and comparison with conventional circuits, and, 4) analysis of manufacturability and technology insertion issues. This report summarizes the progress in each task area since during the period 2 MAY 95 - 16 MAY 95.

Task 1: Assessment of p-Channel Device Fabrication

The assessment of the p-channel 2-D MESFET device fabrication is underway. A preliminary heterostructure design using AlGaAs/InGaAs/GaAs material system has been worked out and a quote for the material growth and analysis is being negotiated. A second structure of p-type GaAs is also being considered for basic ohmic and Schottky contact evaluations. Finally, the prospective use of ion-implantation for ohmic contacts is being investigated. A subcontract to the University of Virginia Department of Electrical Engineering is being negotiated for part of the fabrication tasks.

Task 2: Development of p-Channel 2-D MESFET Model

The initial development of a p-channel 2-D MESFET model is also underway. Our preliminary approach will be to modify the n-channel model to use p-type material parameters including the hole mobility and saturation velocity, Schottky barrier height, and larger series resistance terms.

Task 3: Complementary 2-D MESFET Circuit Simulations

Circuit simulations of complementary 2-D MESFET circuits will take place later in the Phase I project.

Task 4: Manufacturability and Technology Insertion Issues

A comprehensive technology analysis of complementary 2-D MESFET circuits will be performed throughout the duration of the Phase I project. It will serve to summarize the main advantages of a complementary 2-D MESFET over existing technologies and to address any potential barriers to insertion of the complementary 2-D MESFET technology into the large scale IC manufacturing environment.

Distribution List

- 1-4 Dr. Edgar J. Martinez
BLDG 620
2241 Avionics Circle Ste 17
Wright-Patterson AFB OH 45433-7319
TEL: (513) 255-8636
- 5 Mark D. Sauls, Contract Negotiator
Wright Laboratory WL/AAKE BLDG 7
2530 C ST
Wright Patterson AFB OH 45433-7607
- 6 Administrative Contracting Officer
DCMAO Baltimore
ATTN: Chesapeake
200 Towsontown Blvd. West
Towson, MD 21204-5299
- 7-8 Defense Technical Information Center
Building 5, Cameron Station
Alexandria, VA 22304-6145
- 9 Defense Contracts Office
U.S. Federal Court House, Rm 222
255 W. Main Street
Charlottesville, VA 22902
ATTN: Mr. Wade Payne